CLAIMS

1. A precision machine part made of transient liquid phase diffusion bonding metal having a conveyance passage in which liquid or gas of a pipe line or cylinder passes, the precision machine part being divided into a plurality of pieces on an arbitrary face in the axial direction of the conveyance passage, the pieces being adhered to each other by transient liquid phase diffusion bonding.

2. A method of manufacturing a precision machine part made of transient liquid phase diffusion bonding metal, comprising the steps of: dividing a precision machine part into a plurality of pieces on an arbitrary face in the axial direction of a conveyance passage in which liquid or gas of a pipe line or cylinder passes; and adhering the pieces to each other, each piece having alloy used for bonding which contains V in 1 to 10 atomic % on the divided face, by transient liquid phase diffusion bonding in an oxidizing atmosphere containing oxygen in 0.01 mass % or more.

3. A method of manufacturing a precision machine part made of transient liquid phase diffusion bonding metal according to claim 2, wherein the divided face is a single face, continuous multiple faces, divided multiple faces, a continuous curved face or a divided curved face including a conveyance passage in which liquid or gas in a pipe line or cylinder passes.

4. A method of manufacturing a machine part in which transient liquid phase diffusion bonding is conducted under the condition that the temperature is 900° to 1300°C, the surface pressure is 30 MPa at the maximum and the stress loading time is not less than 30 seconds, comprising the step of applying transient liquid phase diffusion bonding alloy containing one of B and P or both of B and P by 1 to 15 atomic % in total, also containing V by 1 to 10 atomic %, the balance being Fe and unavoidable impurities, the transient liquid phase

diffusion bonding alloy being capable of bonding in an oxidized atmosphere, the crystal structure of the transient liquid phase diffusion bonding alloy being substantially amorphous, wherein the amount of contraction in the bonding stress loading direction caused by plastic deformation in the process of bonding is not more than 5% at all positions on a bevel face of the material to be bonded.

5. A method of manufacturing a machine part in which the transient liquid phase diffusion bonding described in claim 1 is used, wherein the transient liquid phase diffusion bonding alloy is an amorphous alloy of Ni base.

6. A method of manufacturing a machine part according to claim 1 or 2, in which transient liquid phase diffusion bonding is used, wherein the method is applied to a part, the surface roughness (Rmax) of the bevel surface of the material to be bonded of which is not more than 100 μm.

7. A method of manufacturing a machine part according to one of claims 1 to 3, in which transient liquid phase diffusion bonding is used, wherein a substantially amorphous bonding alloy is used, the mechanical characteristic or corrosion resistance of the bonding alloy is respectively made suitable for the chemical composition of the material to be bonded, and the bonding alloy contains one or two and more of the following elements in atomic % so as to enhance the joint characteristic.

C: 0.1 to 10.0%
Si: 0.1 to 5.0%
Mn: 0.5 to 5.0%
Cr: 0.1 to 20.0%
Mo: 0.1 to 5.0%
Nb: 0.01 to 5.0%
Ti: 0.01 to 5.0%

8. A method of manufacturing a precision machine

part made of transient liquid phase diffusion bonding metal, comprising the steps of: dividing a precision machine part made of metal having a conveyance passage, in which liquid or gas in a pipe line or cylinder passes, into a plurality of pieces on an arbitrary face in the axial direction of the conveyance passage; realizing isothermal solidification by quick heating the machine part by means of high frequency induction heating in an oxidizing atmosphere, the content of oxygen in which is not less than 0.01 mass%, in a constant temperature furnace; applying bonding stress by a load or Instron type tensile/compression device in the constant temperature furnace; holding at a constant temperature of the bonding temperature for homogenization of the joint structure according to atomic diffusion in the case of transient liquid phase diffusion bonding in the constant temperature furnace in which quick heating including high frequency induction heating is conducted; and conducting cooling rate control after the completion of isothermal solidification by spraying a cooling medium such as water so as to ensure the mechanical characteristic of a portion or the entire machine part.